

CLAIMS

What is claimed is:

1. A system for actuating a pole tip of a write head, the write head including a first pole and a second pole, the system comprising:

a strain element electrically insulated from the first pole and the second pole, the strain element being configured to produce a strain for actuating the pole tip in response to a magnetic field; and

a coil for carrying a current capable of producing the magnetic field at the strain element.

2. The system of claim 1 wherein the pole tip is associated with a fly height and wherein the strain actuates the pole tip by reducing the fly height of the pole tip.

3. The system of claim 2 wherein the strain reduces the fly height of the pole tip by fifty percent.

4. The system of claim 2 wherein the strain reduces the fly height of the pole tip by twenty to thirty Angstroms.

5. The system of claim 1 wherein the strain element further includes a NiMnGa Heusler alloy having a tetragonal martensite structure, the strain being due to a field induced strain in the NiMnGa Heusler alloy.

6. The system of claim 1 wherein the strain element further includes Terfenol-D, the strain being a result of a magnetostriction of the Terfenol-D.

7. The system of claim 1 wherein the strain element further includes an alloy including FeGa, FeGaAl, or FePd, the strain being a result of a magnetostriction of the alloy.

8. A write head comprising:

- a first pole;
- a second pole;
- a write coil residing between the first pole and the second pole;
- a write gap residing between a portion of the first pole and a portion of the second pole;
- a strain element electrically insulated from the second pole, the strain element being configured to produce a strain for actuating the portion of the first pole and the portion of the second pole in response to a magnetic field; and
- a strain element coil for carrying a current capable of producing the magnetic field at the strain element.

9. The write head of claim 8 wherein the pole tip is associated with a fly height and wherein the strain actuates the pole tip by reducing the fly height of the pole tip.

10. The write head of claim 9 wherein the strain reduces the fly height of the pole tip by fifty percent.

11. The write head of claim 9 wherein the strain reduces the fly height of the pole tip by twenty to thirty Angstroms.

12. The write head of claim 8 wherein the strain element further includes a NiMnGa Heusler alloy having a tetragonal martensite structure, the strain being due to a field induced strain in the NiMnGa Heusler alloy.

13. The write head of claim 8 wherein the strain element further includes Terfenol-D, the strain being a result of a magnetostriction of the Terfenol-D.

14. The write head of claim 8 wherein the strain element further includes an alloy including FeGa, FeGaAl, or FePd, the strain being a result of a magnetostriction of the alloy.

15. A method for dynamically actuating a pole tip of a write head, the write head including a first pole and a second pole, the method comprising:

- (a) providing a strain element on the pole tip; and
- (b) driving a current in a strain element coil during a write cycle of the write head, the current capable of producing a magnetic field at the strain element, the strain element being configured to produce a strain for actuating the pole tip in response to the magnetic field.

16. The method of claim 15 wherein the pole tip is associated with a fly height and wherein the strain actuates the pole tip by reducing the fly height of the pole tip.

17. The method of claim 16 current driving step (b) further includes the step of:

- (b1) driving a sufficient current to produce the strain that reduces the fly height of the pole tip by fifty percent.

18. The method of claim 16 wherein the current driving step (b) further includes the step of:

- (b1) driving a sufficient current to produce the strain that reduces the fly height of the pole tip by twenty to thirty Angstroms.

19. The method of claim 15 further comprising the step of:

(c) allowing the strain element coil to be quiescent during a remaining portion of operation of the write head.

20. The method of claim 15 wherein the strain element further includes a NiMnGa Heusler alloy having a tetragonal martensite structure, the strain being due to a field induced strain in the NiMnGa Heusler alloy.

21. The method of claim 15 wherein the strain element further includes Terfenol-D, the strain being a result of a magnetostriction of the Terfenol-D.

22. The method of claim 15 wherein the strain element further includes an alloy including FeGa, FeGaAl, or FePd, the strain being a result of a magnetostriction of the alloy.

23. A method for providing a system for actuating a pole tip of a write head, the write head including a first pole and a second pole, the method comprising:

- (a) providing a first insulator on the second pole;
- (b) providing a strain element on the first insulator, the strain element being configured to produce a strain for actuating the pole tip in response to a magnetic field;
- (c) providing a second insulator on the strain element; and
- (e) providing a strain element coil on the second insulator, the strain element coil for carrying a current capable of producing the magnetic field at the strain element.